BERGHOF

CEDIO-P 24/24/2

Cell Controller

V.1.01

User Handbook

CANtrol®
Your Automation Solution

Copyright © Berghof Automationstechnik GmbH

Reproduction and duplication of this document and utilisation and communication of its content is prohibited, unless with our express permission.
All rights reserved. Damages will be payable in case of infringement.

Disclaimer

The content of this publication was checked for compliance with the hardware and software described. However, discrepancies may arise, therefore no liability is assumed regarding complete compliance. The information in this document will be checked regularly and all necessary corrections will be included in subsequent editions. Suggestions for improvements are always welcome.

Subject to technical changes.

Trademark

CANtrol® // is a registered trademark of Berghof Automationstechnik GmbH

General Information on this Manual

Content:
This manual describes the CANtrol module CEDOP-P 24/24/2 and its modifications. The product-related information contained herein was up to date at the time of publication of this manual.

Completeness:
This manual is complete only in conjunction with the user manual entitled

'Introduction
to CANtrol Automation System'

and the product-related hardware or software user manuals required for the particular application.

Standards:
The CANtrol automation system, its components and its use are based on International Standard IEC 61131 Parts 1 to 4 (EN 61131 Parts 1 to 3 and Supplementary Sheet 1).
Supplementary Sheet 1 of EN 61131 (IEC 61131-4) entitled 'User Guidelines' is of particular importance for the user.

Order numbers:
Please see the relevant product overview in the 'Introduction to CANtrol Automation System' manual for a list of available products and their order numbers.

Ident. No.: 2813620

You can reach us at:

Berghof Automationstechnik GmbH
Harretstr. 1
72800 Eningen / Germany
Telefon: +49 7121 / 894-0
Telefax: +49 7121 / 894-100
E-Mail: controls@berghof.com
www.berghof.com

Berghof Automationstechnik GmbH works in accordance with DIN EN ISO 9001

Update

Version	Date	Subject
1.0	05.07.10	First Version
1.01	22.07.10	Update figure 'Block diagram', 'View of module', Output schematic circuit diagram, positive-switching' and chapter 'Analog outputs characteristics'.

blank page

Contents

1. GENERAL INFORMATION 7

1.1. About This Manual 7

1.2. Hazard Categories and Terminology 8

1.3. Conformity Declaration 8

1.4. Qualified Personnel 9

1.5. Due Diligence 9

1.5.1. Working on the controller module 9

1.6. Use as Prescribed 10

2. PRODUCT DESCRIPTION 11

2.1. Overview 11

2.2. Technical data 13

2.2.1. Technical data of inputs and outputs 14

2.3. Block diagram 15

2.4. View of module and pin assignment 16

2.5. Mounting and connecting 17

2.5.1. Mounting 17

2.5.2. Connecting up 17

2.6. Pin assignment 18

2.6.1. 10/100 Base-T network connection (Ethernet) 18

2.6.2. USB 18

2.6.3. CAN bus 20

2.6.4. Serial Interfaces 20

2.6.5. E-bus 21

3. CONTROLLER OPERATION 23

3.1. Commissioning 23

3.2. Function selection, displays, diagnostics 23

3.2.1. Status displays 23

3.3. Realtime clock with buffer battery 25

4. DIGITAL I/O: CEDIO-P 24/24/2-0.5-1131 / QDIO 24/24/2-0.5 27

4.1. Digital inputs 27

4.2. Inputs with counting function 28

4.3. Digital outputs, positive-switching 29

4.3.1. Output schematic circuit diagram, positive-switching 30

4.3.2. Digital output data 30

5. ANALOG OUTPUTS: CEDIO-P 24/24/2-0.5-1131 AND QDIO 24/24/2-0.5 31
5.1. Analog outputs characteristics 31
5.1.1. Voltage output (schematic circuit diagram) 31
6. CODESYS CONTROL SYSTEM CONFIGURATION: CEDIO-P24/24/2 AND QDIO 24/24/2 33
6.1. Structure of the control system configuration 33
6.2. Digital inputs/outputs 34
6.3. Diagnostic function 34
6.4. Encoder function 34
6.5. Analog outputs 34
7. ANNEX 35
7.1. Environmental Protection 35
7.1.1. Emission 35
7.1.2. Disposal 35
7.2. Maintenance/Upkeep 35
7.3. Repairs/Service 35
7.3.1. Warranty 35
7.4. Nameplate 36
7.5. Addresses and Bibliography 38
7.5.1. Addresses 38
7.5.2. Standards/Bibliography 38

1. General Information

Documentation

This equipment manual is intended for qualified personnel and contains information regarding mounting, installation, commissioning and maintenance.

The information contained in this manual is subject to change without prior notice.

1.1. About This Manual

This equipment manual is an integral part of the product. Make sure the equipment manual is always available near the product's point-of-employment. The manual contains information about the following topics:

- Areas of application;
- Safety;
- Mechanical construction;
- Electrical construction;
- Connections;
- Commissioning;
- Care and maintenance;
- Decommissioning;
- Disposal.

1.2. Hazard Categories and Terminology

DANGER	**Immediate danger** Failure to observe the information indicated by this warning will result in death, serious injury or extensive property damage.
WARNING	**Potential danger** Failure to observe the information indicated by this warning may result in death, serious injury or extensive property damage.
CAUTION	**Danger** Failure to observe the information indicated by this warning may result in injury or property damage.
NOTICE	**No hazard** Information indicated in this manner provides additional notes concerning the product.

1.3. Conformity Declaration

Both the standard version of the controller module and the extension modules mentioned below comply with and make allowance for the following directives and standards:

- **EMP Directive 2004/108/EC**
- **DIN EN 61131-2:2008-4** Programmable controllers
  Part 2: Equipment requirements and tests
- **DIN EN 61000-6-2:2006-3** Electromagnetic compatibility (EMP)
  Part 6-2: Generic standard – immunity for industrial environments
- **DIN EN 61000-6-4:2007-9** Electromagnetic compatibility (EMP)
  Part 6-4: Generic standard – electrostatic discharge for industrial environments

1.4. Qualified Personnel

Only qualified personnel may install, operate and maintain the controller module.

Within the context of this documentation and the safety information it contains, qualified personnel constitutes trained specialists who have the authority to mount, install, commission, ground and identify equipment, systems and power circuits in accordance with the standards of safety technology, and who are familiar with the safety concepts of automation technology.

1.5. Due Diligence

The operator, or the processor (OEM) must ensure that:

- the controller module is only used for the purpose for which it was intended;
- the controller module is only operated in impeccable full working order;
- the user manual is always available in full and in a legible condition;
- only specialists with sufficient qualification and authorisation mount, install, commission and maintain the controller module;
- these specialists are regularly instructed in all relevant questions of occupational health and safety and environmental protection and that they also know the contents of the user manual and especially of the safety notes therein;
- the device markings, identifications, safety and warning notes attached to the controller module are not removed and are always kept in a legible state;
- the national and international regulations for controlling machines and systems which apply at the relevant usage site are observed;
- the relevant information about the controller module and its application and operation is always available to the users

1.5.1. Working on the controller module

Before carrying out work on the controller module you must always:

- first ensure that the controller and the system are in a secure state;
- only then switch off the controller and the system and
- only now disconnect the controller module from the system.

1.6. Use as Prescribed

This is a modular automation system based on the CANbus, intended for industrial control applications within the medium to high performance range.

The automation system is designed for use within Overvoltage Category I (IEC 364-4-443) for the controlling and regulating of machinery and industrial processes in low-voltage installations in which the rated supply voltage does not exceed 1,000 VAC (50/60 Hz) or 1,500 VDC.

Qualified project planning and design, proper transport, storage, installation, use and careful maintenance are essential to the flawless and safe operation of the automation system.

The automation system may only be used within the scope of the data and applications specified in the present documentation and associated user manuals.

The automation system is to be used only as follows:

- as prescribed,
- in technically flawless condition,
- without arbitrary or unauthorized changes and
- exclusively by qualified users

The regulations of the German professional and trade associations, the German technical supervisory board (TÜV), the VDE (Association of German electricians) or other corresponding national bodies are to be observed.

Safety-oriented (fail-safe) systems

Particular measures are required in connection with the use of SPC in safety-oriented systems. If an SPC is to be used in a safety-oriented system, the user ought to seek the full advice of the SPC manufacturer in addition to observing any standards or guidelines on safety installations which may be available.

⚠ WARNING
As with any electronic control system, the failure of particular components may result in uncontrolled and/or unpredictable operation. All types of failure and the associated fuse systems are to be taken into account at system level. The advice of the SPC manufacturer should be sought if necessary.

2. Product description

2.1. Overview

Brief description

The CEDIO-P is a PLC controller with digital and analog I/O and a broad range of data interfaces. The module can be programmed in conformity with IEC 61131-3 (CoDeSys 2.3).

Mounting

The CEDIO-P is designed for integration into switch cabinets on a DIN rail in a rough industrial environment. The fanless design and the flash memory make the cost and effort for maintenance minimal.

Ethernet

An Ethernet interface is available which has 10/100 Mbits. Thanks to the TCP/IP and UDP/IP protocols it is possible to link it very variably to visualisation software, to higher order control units or to an IT infrastructure.

USB

The USB host interface provides a widely used peripheral interface. It can be used, for example to carry out application updates or data migration simply via a USB stick. Please contact our Technical Support if no driver support is available for a specific USB device.

CAN interfaces

The CEDIO-P possesses 2 standard CAN interfaces, both of which can be used up to 1 Mbit/s.

Serial interfaces

The RS232 can also be used as a programming interface.

Realtime clock

A battery-buffered realtime clock can be set at the current time via a software interface.

E-bus extension

The I/O level of the controller can be extended by a maximum of 5 e-bus users via the E-bus plug-in connector

NOTICE E-BUS	**The e-bus is designed for a maximum of 7 users.** However a single component may contain several users. The CEDIO-P24/24/2 requires 2 of these 7 user slots.

Features at a glance

- 400 MHz CPU
- User program memory and data memory (RAM):
  128 MB onboard 96 MB for application
- User program memory (Flash):
  32 MB onboard / 24 MB for application
- Retention memory, 16 kB
- 1 Ethernet 10/100 interface
- 1 USB Host interface V1.1
- 2 CAN interfaces
- 1 RS232 serial interface for programming tools and application
- I/O level can be extended locally via the internal e-bus for up to 5 users (digital / analog)
- Realtime clock

Scope of supply

The scope of supply of the controller module consists of:

- CEDIO-P 24/24/2-0,5-1131; order no.: 201206000

Accessories

PLUG-IN CONNECTOR SET FK QDIO24/24/2; order no.: 201604400
containing PHOENIX plug-in connectors 3.81mm.
The same set of plug-in connectors is also used for the QDIO 24/24/2.

2.2. Technical data

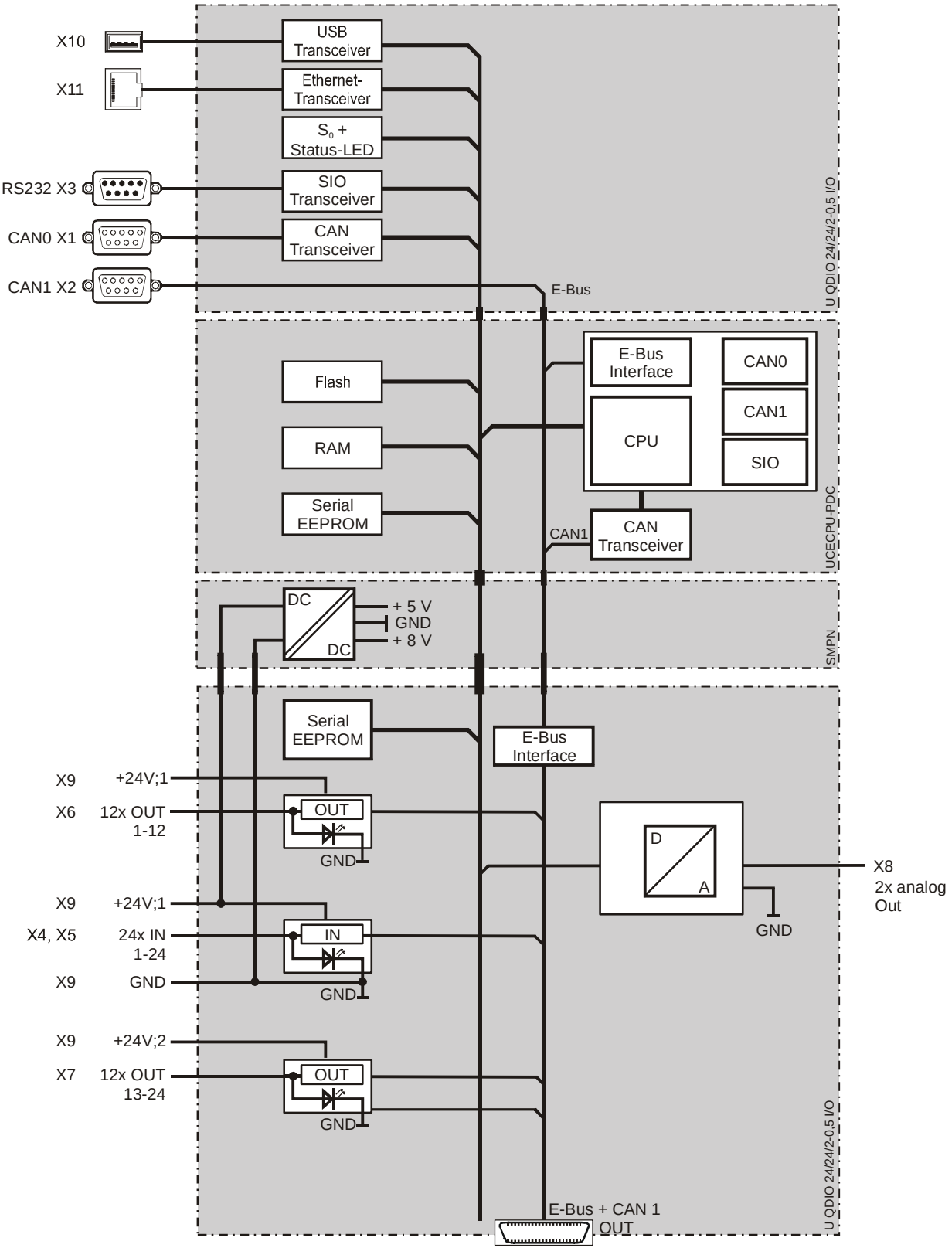
CEDIO-P	
Module data	
Designation	CEDIO-P 24/24/2-0.5-1131
Item no.	201206000
Mounting	Bearing rail NS 35/7.5 EN 50022
Extension	By up to 5 e-bus extension modules, (e.g. QDIO, QAIO)
CPU, user memory	
CPU	Freescale PowerPC 400 MHz
Program memory (Flash):	32 MB onboard / 24 MB for application
Program memory and data memory (RAM)	128 MB onboard / 96 MB for application
Retention memory	16 kB
Development environment	CP1131 (CoDeSys 2.3)
Sizes and weights	
Dimensions (WxHxD [mm])	124 x 170 x 85.5 (in-series dimension B = 113/118.5)
Weight	approx. 700 g
Operating conditions	
Ambient temperature	0°C to 50°C (if installation instructions are observed)
Relative humidity	Max. 85%, non-condensating
Transportation, storage	
Ambient temperature	-20°C to +70°C
Relative humidity	max. 85%, non-condensating
Resistance to vibrations	
Vibration	sinus-shaped (EN 60068-2-6) 10 ... 57 Hz
Shock resistance	15 G (approximately 150 m/s²), 10 ms duration, half sine (EN 60068-2-27)
EMC, protection class	
Emitted interference	DIN EN 61000-6-4, industrial sector
Immunity to interference	DIN EN 61000-6-2, industrial sector
Protection class	III
Insulation strength	DIN EN 61131-2; DC 500 V test voltage
Protection class	IP20
Energy supply (24 V power pack)	
Supply voltage	+24 VDC (-15% / +20%) SELV max. residual ripple 5%
Power consumption	Max. 0.5 A at +24 VDC (in no-load mode), max. 10A fuse depending on load on the I/O
Polarity reversal protection	Yes
Potential isolation	Yes, between system electronics (CAN bus) and I/O

Ethernet interface	
Number and type of interfaces	1x 10/100 Base T
Connection technology	RJ45
USB interfaces	
Number and type of interfaces	1 x Host USB Rev. 1.1
Mating cycles	Max. 1,000
CAN bus interfaces	
Number and type of interfaces	2x standard CAN ISO 11898
Potential isolation	No
Transmission rate	Max. 1 Mbit/s
Terminator resistor	Can be connected
Serial Interfaces	
Number and type of interfaces	1x RS232
Potential isolation	No
E-bus interface	
Interface types	I/O extension bus for up to 5 e-bus users Module accommodates 2 e-bus users
Other functions	
Realtime clock	Yes, battery-buffered Buffer service life typically approx. 10 years / monitoring by means of software (refer to controller configuration)

2.2.1. Technical data of inputs and outputs

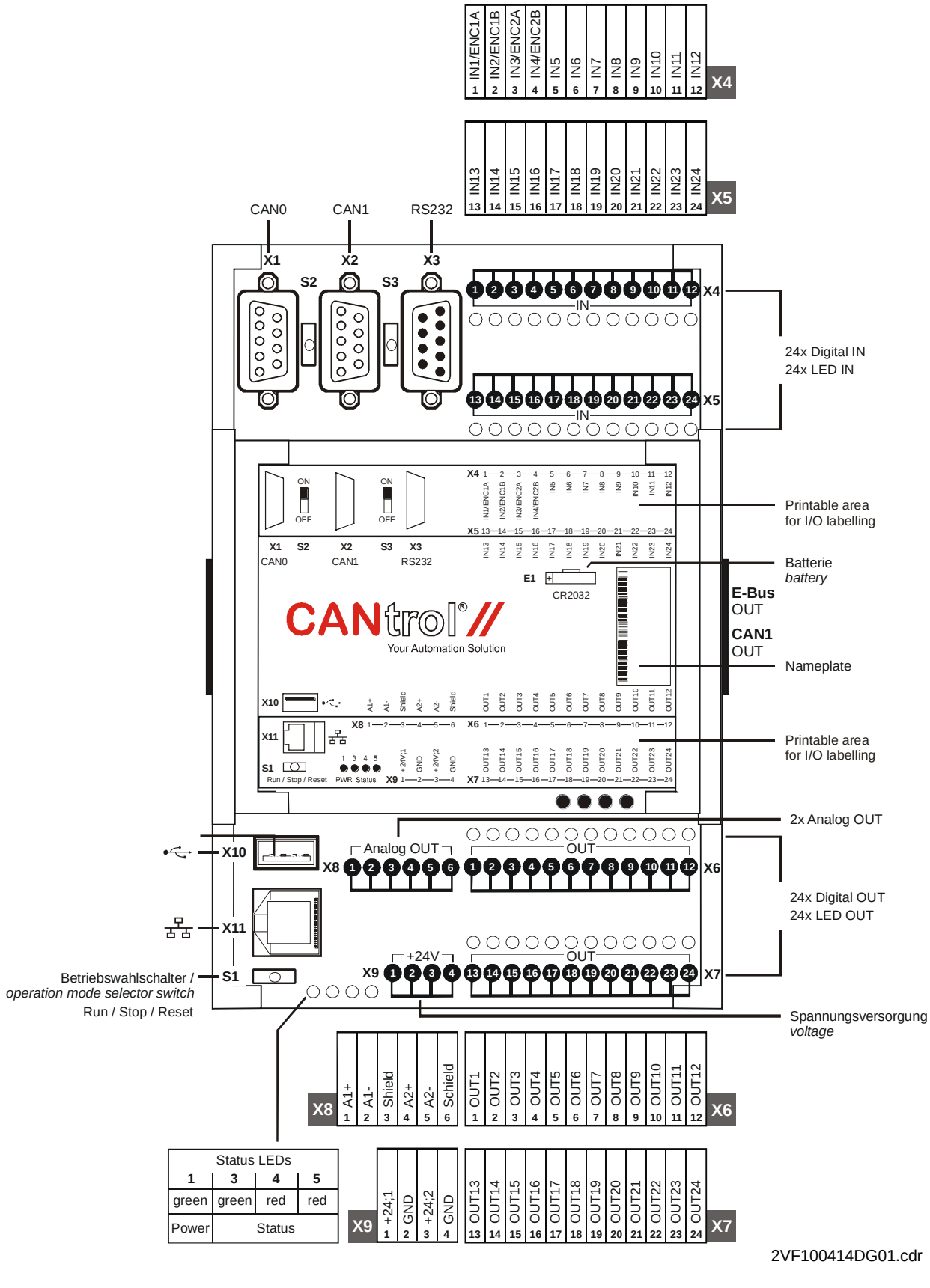
Digital inputs/outputs (DIO)	
Number of inputs	24, 4 of which can be used as +24 V encoder inputs; Counting frequency for 4x evaluation: < 10 kHz
Number of outputs	24 (divided into 2 groups with separate supplies)
Output current	Single output: 0.5 A feasible, max. 4 A in total per group consisting of 12 outputs
Short circuit protection	Yes
Potential isolation	No
Connection technology	Vertical front wiring for 3.81 plug strips (not included in scope of supply)
Analog outputs	
Number	2 analog -/+ 10V outputs
Accuracy at 25°C	+/- 1%
Resolution	12 bits
Connection technology	Vertical front wiring for 3.81 plug strips (not included in scope of supply)

2.3. Block diagram



2VF100413DG01.cdr

2.4. View of module and pin assignment



2.5. Mounting and connecting

2.5.1. Mounting

Mounting and dismounting and connection of the earth terminal is carried out in compliance with the description in the CANtrol introductory manual.

2.5.2. Connecting up

Power supply

The controller is energised from an external 24 VDC external power supply. Before connecting up, check that the specifications required for the external power supply are observed.

External power supply (24 VDC)	
Output voltage	+24 VDC SELV (-15% / +20%)
Residual ripple	Max. 5% The DC voltage must not fall below 20.4 V.

The module has two supply connections.

+24V;1 supplies the internal system electronics (inputs), outputs 1-12, and the analog outputs;

+24V;2 supplies outputs 13-24. To disable outputs 13-24 directly the +24V;2 supply can be disconnected on the plus side.

Internal power supply

A power supply for the system electronics is installed to provide a 24-VDC input voltage (-15% / +20%). The power supply possesses integrated polarity reversal protection and inrush current limitation.

Both supply lines and the power supplies must be protected by an external short circuit and overload protection with a maximal tripping current of 5 A in each case (depending on the number of I/O).

Installation

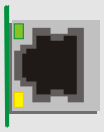
All connections and lines must be executed so that no faults are caused by inductive and capacitive interference in the controller. The supply lines must be sufficiently resilient to current and voltage.

2.6. Pin assignment

2.6.1. 10/100 Base-T network connection (Ethernet)

The 10/100 Base-T onboard Ethernet adapter with RJ-45 connection facilitates connection to the network. The “LNK” and “RCV” status LED give information about successful connection to the network.

X11 plug-in connector Assignment:

X11		
 RJ45	**1**	TX+
	2	TX-
	3	RX+
	4	75 Ohm
	5	75 Ohm
	6	RX-
	7	75 Ohm
	8	75 Ohm
“LNK” LED	**green**	ON – ready to operate
“RCV” LED	**yellow**	FLASHING – receiving data

2.6.2. USB

Devices with USB interfaces can be connected on the USB master port (rev. 1.1).

The only categories of USB devices which can be used by CoDeSys users are USB sticks. A mouse can only be used at the level of Linux.

The following issues must be taken into account when using USB sticks:

⚠ CAUTION

A USB stick may only be unplugged during operation if all file operations have been completed, otherwise the USB may become unserviceable!

If programs still have files open, the directory cannot be deleted when the USB stick is unplugged. In this situation file or directory operations cause blockages because a reading must be taken from a device which is no longer available in the system. Therefore, when removing the USB stick, always make sure that no program has any files open on the USB stick.

- USB memory sticks can be plugged in and removed during operation. The plugged-in device is automatically identified and mounted in the /media/usbX directory. When the USB stick is unplugged the relevant /media/usbX directory automatically “vanishes” again, if it is no longer being accessed by a program (see above).
- Either the first partition or – if there is no partition – the entire memory is mounted on the memory stick, i.e. it appears automatically in the appropriate directory.

- The first stick is mounted under /media/usb0, the second under /media/usb1, etc. Maximally 8 sticks can be plugged in and used at once (/media/usb [0-7]. If a new stick is plugged in (or one which has previously been plugged in and then removed), it will be placed in the directory bearing the lowest free number. By connecting a USB hub it is possible to operate multiple sticks on one USB interface. In this case attention must be paid that there are no USB devices still attached to the hub when it is plugged in and unplugged.

NOTICE

The mechanical structure of the USB port is designed for max. 1,000 mating cycles.

X10 plug-in connector Assignment

X10		
USB	**B1**	VCC
	B2	D-
	B3	D+
	B4	GND

CAUTION

The maximum current available on the USB port is 0.1 A!

Before you use the USB device, check its power consumption.

The controller performs a reset if a USB device requires more than the max. permissible current.

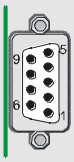
A reset immediately stops the controller and the machine and plant it is controlling. This may cause more extensive damage.

A USB device requiring more current cannot function and may be damaged by this.

2.6.3. CAN bus

The two CAN interfaces (CAN0/CAN1) conform to the ISO 11898 standard and can be operated up to the maximum Baud rate of 1 MBit/s. The lowest Baud rate which can be set is 50 kBit/s.

X1/2 plug-in connector Assignment:

X1/2		
 Sub-D9 M	**1**	NC (Do not connect)
	2	**CAN_L**
	3	**CAN_GND**
	4	NC (Do not connect)
	5	NC (Do not connect)
	6	NC (Do not connect)
	7	**CAN_H**
	8	NC (Do not connect)
	9	NC (Do not connect)

NOTICE

A terminating resistor can be connected by means of the S2 (CAN0) and S3 (CAN1) switches.

This is necessary if the appropriate CAN interface is located at the beginning or end of the relevant CAN-bus topology.

2.6.4. Serial Interfaces

NOTICE

The RS232 interface X3 has an exceptional position!

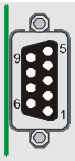
Depending on the configuration it can either be used as a Linux console or as a PPP interface for remote maintenance or as a CoDeSys programming interface.

If the controller is started in the configuration mode, the module can be configured via a serial PPP connection in this mode. Here, too, the connection is made via X3.

The interfaces in the software are addressed by the following names:

Plug-in connector	Software interface
X3	COM1

X3 plug-in connector RS232 assignment:

X3		
 Sub-D9 F	**1**	NC (Do not connect)
	2	**RXD**
	3	**TXD**
	4	NC (Do not connect)
	5	**GND**
	6	NC (Do not connect)
	7	NC (Do not connect)
	8	NC (Do not connect)
	9	NC (Do not connect)

2.6.5. E-bus

The e-bus enables up to 7 e-bus users to connect up to the controller module.

Please note that some e-bus modules represent 2 e-bus users owing to their functions, such as for example: CEDIO-P 24/24/2.

Blank page

3. Controller operation

When in operation do not plug in, place on, release or touch!
The result can be destruction or malfunction. Before working on the modules switch off all feeds including those of the connected peripherals, such as externally-supplied sensors, programming devices etc.

3.1. Commissioning

Before applying the supply voltage check all connections again for correct wiring and polarity.

Switching on The module has no mains switch of its own. When switching on the system or connecting the power supply the PLC is started.

Switching off When switching off the system or disconnecting it from its own power supply, the PLC must be switched off.

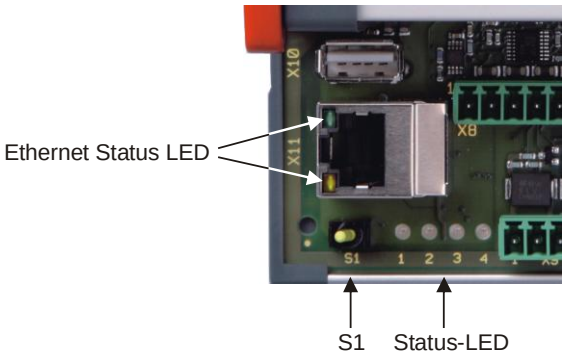
3.2. Function selection, displays, diagnostics

3.2.1. Status displays

The function of the status displays often depends on which software development environment is used on the PLC.

CP1131-P: PLC programming with CoDeSys and the Berghof Target Support Package.

CPC++: C programming directly on the LINUX operating system.



2VF100418DG00.cdr

Operating mode switch (S1) the purpose of switching from one operating mode to another and for serves restarting the module.

Position of switch	CP1131-P	CPC++
RUN	CP1131-P program in RUN state. Can be changed by means of a programming device.	Freely programmable
STOP	CP1131-P program in STOP state.	Freely programmable
RESET	CP1131-P program restart with deleted variables (RETAIN variables are not deleted)	Freely programmable

Status LED

4 operating status LED indicate the current status of the voltage supply, module mode and error messages.

LED		Logic status
1	**PWR** (green)	ON = correct voltage supply to the module electronics

Status LED for CP1131-P programs

Status 3 (green)	Status 4 (red)	Status 5 (red)	Description
On	Off	User-defined	User program status: RUN
Off	On	User-defined	User program status: STOP
Off	Flashing	User-defined	User program status: FAIL STOP
Flashing	On	User-defined	User program status: Breakpoint STOP
User-defined	User-defined	On	CP1131 mode: FORCE

Basic procedure in case of FAILSTOP:

- Establish cause of error (read via web browser)
- Eliminate cause of error
- Perform reset on controller
  Alternatively: Mode selector switch / CoDeSys / web browser
- Put controller back into operation

NOTICE

CP1131-P mode FORCE:
FORCE means that the user program is running and a value is compulsorily attributed to at least one variable at the beginning of each cycle via CoDeSys. The user can therefore see that without this intervention in the sequence of the PLC program the user program might react differently.

Status LED for CPC++ programs

LED 3 to 5 can be controlled by means of user software.

Ethernet status LED

Refer to section: 10/100 Base-T network connection (Ethernet).

3.3. Realtime clock with buffer battery

The CEDIO-P is equipped with a realtime clock.

Setting the clock Either via the web configuration or via the CoDeSys library 'BGHSysLibRtc.lib

Energy supply A battery is required to supply this clock with energy.

Charge status The charge status of the buffer battery is monitored by the controller.
The CoDeSys controller configuration for the CEDIO-P shows the charge status of the battery (refer to section: Controller configuration).

Changing the battery Batteries are not intended to be changed:

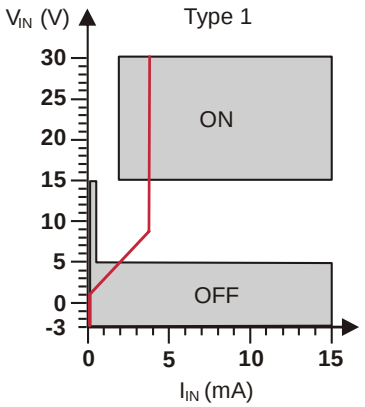
NOTICE
The battery is designed for the entire service life (typ. 10 years) of the controller. Therefore normally the user never needs to change the battery. If a change of battery is nevertheless necessary, it must be carried out professionally by the manufacturer of the module.

Blank page

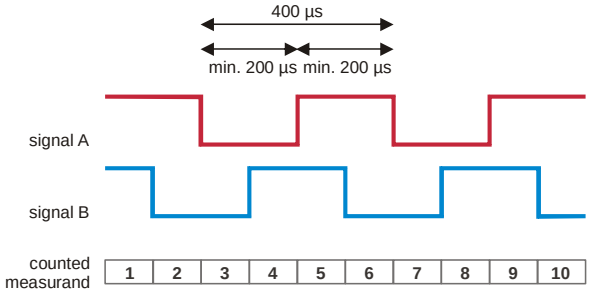
4. Digital I/O: CEDIO-P 24/24/2-0.5-1131 / QDIO 24/24/2-0.5

Type	Number
Digital inputs	24
Of which the number of counting inputs	4
Digital outputs	24

4.1. Digital inputs

Module data	
Number	24
Designation	IN1 – IN24
Characteristics	
Transition range	5 V to 12 V
Input type according to IEC 61131-2	Type 1, current at 24 V approximately 3.6 mA. *(suitable for electr. outputs)* Type 2, by connecting 2 inputs in parallel (*suitable for contact-based signals).*
Common potential	All inputs are referenced to the same IO-GND potential
Evaluation	Scan rate by the e-bus 250 µs Scan rate by CoDeSys at least 1 ms
Status display	via orange LED
Current-voltage curve	 2VF100415DG00.cdr

4.2. Inputs with counting function

Counting units	
Number	2 counting units
Connection	ENC1A = IN1 ENC1B = IN2 ENC2A = IN3 ENC2B = IN4 Each counting unit is connected by means of two 24-V inputs. The status of the inputs used as counters can also be read-in.
Counting modes	Quadrature decoders
Maximum counting frequency	10 kHz
Minimum pulse width	200 µs
Counter width	32 bits in the CodeSys system
Current-voltage curve	 2VF100416DG00.cdr

4.3. Digital outputs, positive-switching

Number	24
Group 1	OUT1-OUT12
Group 2 (can be switched off separately)	OUT13-OUT24

WARNING

OVERVOLTAGE

In the case of overvoltage >32 V and / or energetic recovery the module may be destroyed. This is a fire hazard!

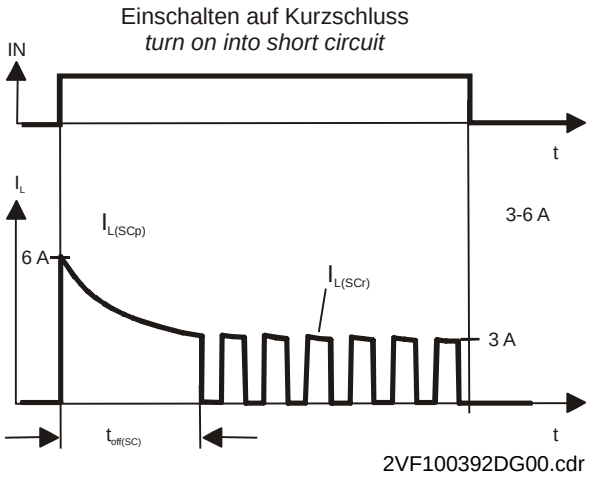
If you adjust outputs to 24 V from the outside for test purposes, the relevant module must be supplied with the same voltage, otherwise energetic recovery may occur, which is not permitted.

Outputs

The outputs are positive-switching, 24-V outputs. Output current max. 500 mA per output. The outputs have a common reference potential (IO_GND). If there is no data connection to the CPU or if the internal supply of the module is not sufficient, the outputs automatically switch to '0' (LOW).

Protected output

In case of overload the current is limited (typically 3A). After the overload has been eliminated, the output is again available. Fast de-excitation by means of a 41 V terminal voltage in relation to L+ protects all outputs against induced peak voltages with inductive loads.
If thermal loads occur owing to energetic recovery or fast de-excitation, the overload protection may react prematurely also in the case of outputs which are not involved.

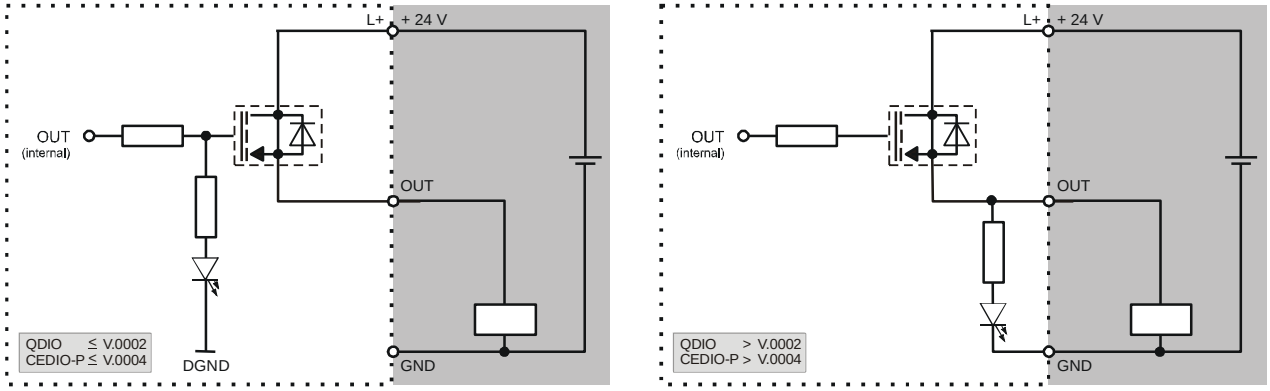


CAUTION

Der max.The max. output current is 0.5 A

The output stage is protected against overload, which must be taken into account for high inrush currents from lamps, for example.

4.3.1. Output schematic circuit diagram, positive-switching



2VF100420DG01.cdr

4.3.2. Digital output data

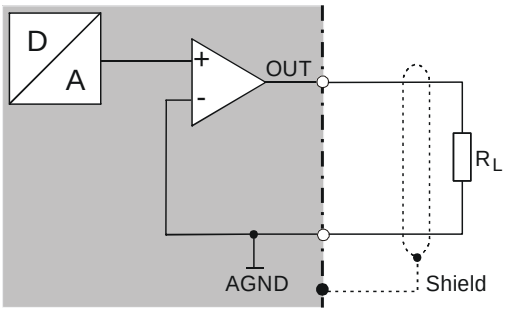
Module data	
Type of outputs	Semiconductor, non-storing
Protection circuit for inductive loads	Fast de-excitation 41 V terminal voltage (typ.) approx. +24 V
Power loss due to de-excitation	max. 0.5 W / output max. 4 W / module
Status display	Orange LED per output
Overload protection	In case of thermal overload
Short circuit protection[1) 2) 3)] Response threshold	Electronic current limitation typically 3 A. Avoid tripping under normal service conditions.
1) Current is limited electronically. Triggering the short circuit protection causes thermal overload and tripping of the thermal overload protection 2) Starting from cold, maximally 10,000 permissible short circuits. 3) Duration of a short circuit, maximally 500 hours.	
Exit delay if '0' is after '1' if '1' is after '0'	typically 1ms typically 1ms
Output capacity	< 100 nF
Rated voltage Voltage drop (in the case of rated current)	DC +24 V < 0.1 V
Rated current with '1' signal	0.5 A
Total current of all outputs per group	max. 4 A
Two outputs switched in parallel for logic link for increased output	 permissible permissible up to 1 A

5. Analog outputs: CEDIO-P 24/24/2-0.5-1131 and QDIO 24/24/2-0.5

5.1. Analog outputs characteristics

Module data	
Number	2
Designation	AO1-AO2
Connections per output	PE for shield, GND, AO
Voltage output	
Signal range	-10..+10V
Load impedance range	>= 1000 Ohm, <10 nF
Overload	Short-circuit proof
Reference potential	IO-GND
Digital resolution	12 bits
Accuracy at 25°C	+/- 1%
Dynamic characteristics	
Maximum setting time if there is a reversal covering the full range (99.5%)	10 ms
Greatest temporary deviation during electrical interference test	+/-10 %

5.1.1. Voltage output (schematic circuit diagram)



2VF100417DG00.cdr

Blank page

6. CoDeSys control system configuration: CEDIO-P24/24/2 and QDIO 24/24/2

NOTICE	**Prerequisites:** Berghof Target V204 and Firmware V2.12.0

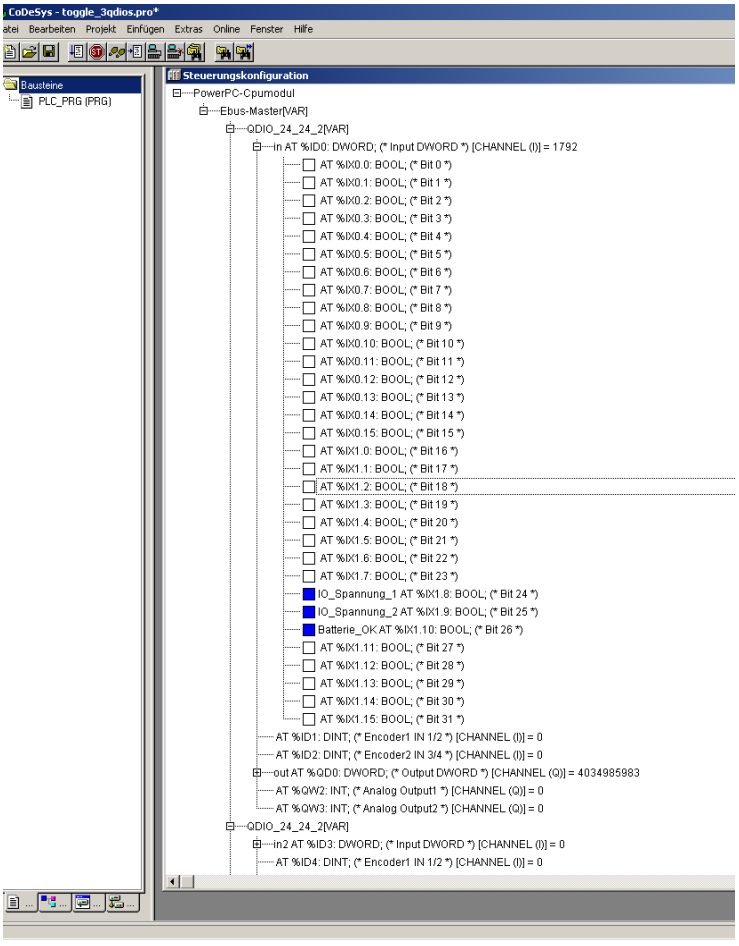
6.1. Structure of the control system configuration

The CANtrol controllers are modular in design. From the point of view of the control system configuration they consist of a CPU module and an I/O module which is connected to the CPU module via the e-bus.

This means that for the CEDIO 24/24/2 the control system is configured as follows:

- PowerPC-CPU module
- E-bus Master
- QDIO_24_24_2

NOTICE	**If a QDIO24/24/2 is used additionally, a further QDIO_24_24_2 element is added.** QDIO_24_24_2 is used by CEDIO24/24/2 and QDIO24/24/2.


CoDeSys - toggle_3qdios.pro*
atei Bearbeiten Projekt Einfügen Extras Online Fenster Hilfe
Bausteine
PLC_PRG (PRG)
Steuerungskonfiguration
PowerPC-Cpumodul
Ebus-Master[VAR]
QDIO_24_24_2[VAR]
in AT %ID0: DWORD; (* Input DWORD *) [CHANNEL (I)] = 1792
AT %IX0.0: BOOL; (* Bit 0 *)
AT %IX0.1: BOOL; (* Bit 1 *)
AT %IX0.2: BOOL; (* Bit 2 *)
AT %IX0.3: BOOL; (* Bit 3 *)
AT %IX0.4: BOOL; (* Bit 4 *)
AT %IX0.5: BOOL; (* Bit 5 *)
AT %IX0.6: BOOL; (* Bit 6 *)
AT %IX0.7: BOOL; (* Bit 7 *)
AT %IX0.8: BOOL; (* Bit 8 *)
AT %IX0.9: BOOL; (* Bit 9 *)
AT %IX0.10: BOOL; (* Bit 10 *)
AT %IX0.11: BOOL; (* Bit 11 *)
AT %IX0.12: BOOL; (* Bit 12 *)
AT %IX0.13: BOOL; (* Bit 13 *)
AT %IX0.14: BOOL; (* Bit 14 *)
AT %IX0.15: BOOL; (* Bit 15 *)
AT %IX1.0: BOOL; (* Bit 16 *)
AT %IX1.1: BOOL; (* Bit 17 *)
AT %IX1.2: BOOL; (* Bit 18 *)
AT %IX1.3: BOOL; (* Bit 19 *)
AT %IX1.4: BOOL; (* Bit 20 *)
AT %IX1.5: BOOL; (* Bit 21 *)
AT %IX1.6: BOOL; (* Bit 22 *)
AT %IX1.7: BOOL; (* Bit 23 *)
IO_Spannung_1 AT %IX1.8: BOOL; (* Bit 24 *)
IO_Spannung_2 AT %IX1.9: BOOL; (* Bit 25 *)
Batterie_OK AT %IX1.10: BOOL; (* Bit 26 *)
AT %IX1.11: BOOL; (* Bit 27 *)
AT %IX1.12: BOOL; (* Bit 28 *)
AT %IX1.13: BOOL; (* Bit 29 *)
AT %IX1.14: BOOL; (* Bit 30 *)
AT %IX1.15: BOOL; (* Bit 31 *)
AT %ID1: DINT; (* Encoder1 IN 1/2 *) [CHANNEL (I)] = 0
AT %ID2: DINT; (* Encoder2 IN 3/4 *) [CHANNEL (I)] = 0
out AT %QD0: DWORD; (* Output DWORD *) [CHANNEL (Q)] = 4034985983
AT %QW2: INT; (* Analog Output1 *) [CHANNEL (Q)] = 0
AT %QW3: INT; (* Analog Output2 *) [CHANNEL (Q)] = 0
QDIO_24_24_2[VAR]
in2 AT %ID3: DWORD; (* Input DWORD *) [CHANNEL (I)] = 0
AT %ID4: DINT; (* Encoder1 IN 1/2 *) [CHANNEL (I)] = 0

6.2. Digital inputs/outputs

The QDIO24/24/2 and the CEDIO 24/24/2 possess 24 digital inputs and 24 digital outputs. These are supplied by 2 separate voltages. On the CEDIO24/24/2 the module electronics are also supplied with supply voltage 1.

The control system configuration encompasses a total of 32 inputs and 32 outputs. Some of these inputs are used for diagnosing the module. The other I/O, which are not being used, remain reserved and may not be used.

Input bit	Function
0 to 23	24 V input
24 to 26	Diagnosis
27 to 31	Reserved

Output bit	Function I
0 to 23	24 V output
24 to 31	Reserved

6.3. Diagnostic function

Input bit	Bit = TRUE
24	Supply voltage 1 OK (X9; 24V;1)
25	Supply voltage 2 OK (X9; 24V;2)
26	Battery voltage OK (CEDIO-P24/24/2 only)

6.4. Encoder function

Up to two 24-volt encoders can be connected on the inputs. Maximum counting frequency: 10 KHz.

Input bit	Function
0 and 1	Encoder 1 (X4; IN1 and IN2)
2 and 3	Encoder 2 (X4; IN3 and IN4)

6.5. Analog outputs

Values range from –10000 to +10000 mV

If higher or lower values are configured the controller reports a failure, goes into the Fail Stop state and a diagnostic entry bearing the value:

- xxxxxxxx:fffffd3:67020088: CP1131 : eBERR:eIO_FAIL is written.

7. Annex

7.1. Environmental Protection

7.1.1. Emission

When used correctly, our modules do not produce any harmful emissions.

7.1.2. Disposal

At the end of their service life, modules may be returned to the manufacturer against payment of an all-inclusive charge to cover costs. The manufacturer will then arrange for the modules to be recycled.

7.2. Maintenance/Upkeep

⚠ WARNING	**Do not insert, apply, detach or touch connections while in operation – risk of destruction or malfunction.** Disconnect all incoming power supplies before working on our modules; this also applies to connected peripheral equipment such as externally powered sensors, programming devices, etc. All ventilation openings must always be kept free of any obstruction.

The modules are maintenance-free when used correctly.
Clean only with a dry, non-fluffing cloth.
Do not use detergents.

7.3. Repairs/Service

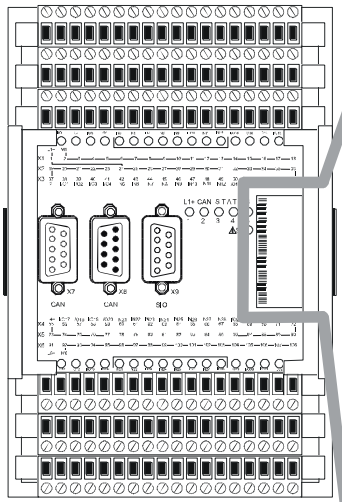
⚠ WARNING	Repair work may only be carried out by the manufacturer or its authorised service engineers.

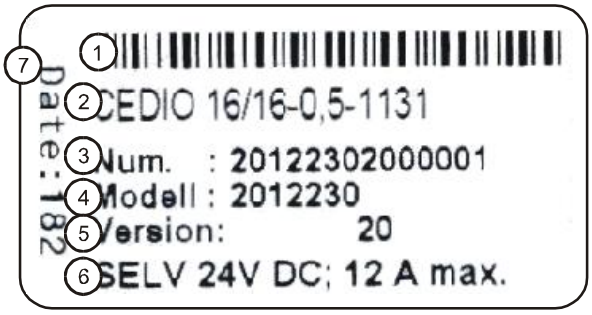
7.3.1. Warranty

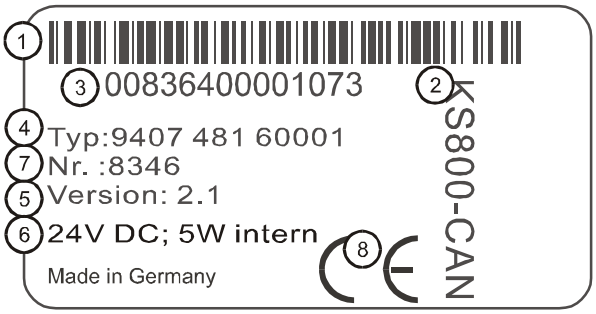
Sold under statutory warranty conditions. Warranty lapses in the event of unauthorised attempts to repair the equipment and/or product, or in the event of any other form of intervention.

7.4. Nameplate

Erklärungen zu den Typenschildern (Beispiel)
nameplate descriptions (example)







Barcode Identifizierungs-Nr. *identification-no.* 1

Modul-Typ *module type* 2

Identifizierungs-Nr. *identification-no.* 3

Modell / Bestell-Nr. *model / order-number* 4

Version 5

Versorgungsspannung *supply voltage* 6

Datum / *Date* 7

CE Kennzeichnung *CE mark* 8

2VF100080DG01.cdr

1. **Barcode**
   same as identification number.
2. **Module type**
   plain-text name of module.
3. **Identification no.**
   module's identification number.
4. **Model/order no.**
   You only need to give this number when ordering a module. The module will be supplied in its current hardware and software version.
5. **Version**
   defines the design-level of the module as supplied ex-works.
6. **Supply voltage**
7. **Date**
   internal code.
8. **CE mark**

NOTICE

The 'Version' (supply version) panel specifies the design-level of the module as supplied ex-works.

When replacing a module, users, with the CNW (CANtrol Node Wizard) tool, can read off the current software version of the newly supplied module, and then reload their 'own' software version for a particular project if necessary. With the latter in mind, before the download you should always keep a record of the existing software levels in your project documentation (software version, node IDs, baud rate, etc.).

7.5. Addresses and Bibliography

7.5.1. Addresses

CiA

'CAN in Automation', international manufacturers and users organisation for CAN users in the field of automation:

CiA - CAN in Automation e.V.
Am Weichselgarten 26
D-91058 Erlangen /Germany
e-mail: headquarters@can-cia.de
http://www.can-cia.de

DIN-EN Standards

Beuth Verlag GmbH
10772 Berlin

or

VDE-Verlag GmbH
10625 Berlin

IEC Standards

VDE Verlag GmbH
10625 Berlin

or

Internet search
http://www.iec.ch/

7.5.2. Standards/Bibliography

IEC61131-1/EN61131-1	Programmable controllers Part 1: General information
IEC61131-2/EN61131-2	Programmable controllers Part 2: Equipment requirements and tests
IEC61131-3/EN61131-3	Programmable controllers Part 3: Programming languages
IEC61131-4/EN61131Bl1	Programmable logic controllers Supplementary Sheet 1: User guidelines
IEC61000-6-4 / EN61000-6-4	German EMC Act: Emitted interference
IEC61000-6-2 / EN61000-6-2	German EMC Act: Noise immunity
ISO/DIS 11898	Draft International Standard: Road vehicles - Interchange of digital information - **C**ontroller **A**rea **N**etwork (CAN) for high-speed communication
EN 954-1	Safety of machinery: Safety-related parts of control systems (Part 1)
Bibliography	A variety of specialist publications on the CANbus is available from specialist bookshops, or can be obtained through the CiA users' organisation.

NOTICE

Our Technical Support team will be glad to provide other literature references on request.